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Biocorrosion of materials and sick building syndrome

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Abstract

© 2018 CSIRO. All rights reserved. The problem of biological damage of mineral building materials and structures based on them is multifaceted and covers all types of industry. The most destructive biocorrosion impacts are on building materials in cities with a large water area. Various types of microorganisms, including pathogens, and especially the filamentous fungi of the genera Aspergillus, Penicillium, Trichoderma, etc., occupy the surfaces of mineral building materials, cause their destruction, disturb the ecological balance of cities and endanger the human health. The term 'sick building syndrome' (SBS) is used to describe a situation when the residents of a building experience acute health-or comfortrelated effects that seem to be linked directly to the time spent in the building wherein no specific illness or cause can be identified. Biological contaminants, in particular micromycetes, can present one of the possible causes of SBS. Here, we assessed the biodeterioration level of structural materials on the basis of fine-grained concrete widely used in construction practice and architecture. First, we determined the strength characteristics of the material that has been biologically damaged; second, we identified the damaging micromycetes and analysed their metabolic activity related both to the induction of biocorrosion and to the impacts of fungi on human health. Applying a new integrated approach, which combines methods of molecular microbiology and genetic toxicology with standard methods for determining the strength of building structures, we confirmed the relation between biodestructive and pathogenic properties of micromycete isolates.

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